

REMARKS

Claim Status

Claims 1-8 are pending. Claims 1, 4 and 6-8 have been amended. Claims 2 and 3 have been canceled, but the subject matter thereof has been incorporated into independent claim 1. No new matter has been added. Reconsideration of the application, as amended, is respectfully requested.

Brief Overview of the Disclosed Subject Matter

An optoelectronic component includes an epitaxial semiconductor layer sequence having an active zone that emits electromagnetic radiation, and at least one electrical contact region having at least one radiation-transmissive electrical contact layer, which contains ZnO and is electrically conductively connected to an outer semiconductor layer. The contact layer is provided with watertight material so as to adequately protect it against moisture (see paragraph [0006] of the originally-filed specification).

Patentability of the Claims Under 35 U.S.C. §102

Claims 1-8 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,724,013 (“*Kneissl*”). Applicants have carefully considered the Examiner's rejection, and the comments provided in support thereof, and respectfully disagree with the Examiner's analysis. For the following reasons, Applicants respectfully assert that all claims of the present application are patentable over the cited reference.

Kneissl relates to “a p-n tunnel junction between a p-type semiconductor layer and an n-type semiconductor layer which provides current injection for an edge-emitting nitride based

semiconductor laser structure”. According to *Kneissl*, “the p-n tunnel junction reduces the number of p-type semiconductor layers in the nitride based semiconductor laser structure which reduces distributed loss, reduces threshold current densities, reduces the overall series resistance and improves the structural quality of the laser by allowing higher growth temperatures” (see col. 3, line 61 thru col. 4, line 3).

Kneissl teaches an edge emitting semiconductor laser diode structure (see col. 1, line 17). According to *Kneissl*, “dry-etching is ... used to etch a narrower portion of the laser structure 200 down to the electron blocking layer 214 in order to form a ridge-waveguide structure” (see col. 7, lines 6-10). As taught in *Kneissl*, the narrow portion of the laser structure 200 comprises a contact layer 224 which is formed by n-type GaN:Si, wherein n-type ZnO is mentioned as one of several alternative materials from which to form the contact layer (see col. 6, lines 57-64).

Kneissl states that “the exposed etched surfaces [of the laser structure] can be covered with an insulating dielectric” (see col. 7, lines 10 to 11). Also, in the embodiment shown in Fig. 2 of *Kneissl*, a surface of the contact layer 224 that faces away from the laser structure 200 is completely covered by an electrode layer 228. With additional reference to Fig. 2 of *Kneissl*, the free faces of the contact layer 224 of the laser structure 200 are coincidentally completely covered with the electrode layer 228 and the insulating dielectric layer 225. However, *Kneissl* fails to teach the present claimed limitation of “at least one electrical contact region having a bonding pad and at least one radiation-transmissive electrical contact layer, which contains ZnO and is electrically conductively connected to an outer semiconductor layer, wherein a surface of said contact layer which is disposed to face away from said outer semiconductor layer is completely or partially free of said bonding pad; and a watertight material applied wherever said surface of the contact layer is free of said bonding pad so as to protect the contact layer from

moisture,” as recited in amended independent claim 1.

Kneissl fails to teach that moisture can have a negative influence on the contact properties of contact layers comprising ZnO and that such contact layers should be protected against moisture. The dielectric layer 225 of *Kneissl* is applied in order to protect the exposed etched surfaces. Consequently, if the exposed surfaces of *Kneissl* were not etched, the insulating dielectric layer 225 would become unnecessary.

As shown in Fig. 2 of *Kneissl*, the electrode layer 228 is applied over the entire upper surface of contact layer 224. This is only possible due to the fact that this laser is an edge emitting laser so that no light is coupled out of the laser structure 200 through the upper surface of the contact layer 224.

In a vertically emitting laser structure, the electrode layer 228 would of necessity only be positioned to cover a part of the contact layer 224. Otherwise, it would block the exit of light from the device. As a result, the contact layer would not be completely covered by any watertight material. This aspect of vertically emitting lasers is reflected in amended independent claim 1, wherein the bonding pad is a part of the electrical contact region, and prevents the contact layer from being completely covered by the watertight material. Claim 1 has also been amended to recite that “a surface of said contact layer which is disposed to face away from said outer semiconductor layer is completely or partially free of said bonding pad.” Support for this feature may be found in paragraph [0008] of the originally filed specification, which states that “a bonding pad may be situated on the contact layer or in a window of the contact layer.”

Applicants sole figure shows a case where the bonding pad 9 is applied in a window of the contact layer 7, with the upper surface of contact layer 7 being completely free of bonding pad 9. In the case where a bonding pad 9 is applied directly onto the continuous contact layer 7,

the upper surface of contact layer 7 is only partially free of the bonding pad 9. *Kneissl* fails to anticipate the subject matter of amended claim 1, since *Kneissl* teaches a laser structure in which its contact layer 224 is completely covered by its electrode layer 228, i.e. the upper surface of contact layer 224 is not partly or completely free of the electrode layer 228.

In view of the foregoing, *Kneissl* fails to teach the invention recited in amended claim 1. Consequently, reconsideration of the rejection under 35 U.S.C. §102(a) is in order, and a notice to that effect is earnestly solicited.

Moreover, based on the teachings of *Kneissl*, a person skilled in the art is not provided with any motivation to reduce the coverage area of the electrode layer 228, since the laser structure 200 disclosed in *Kneissl* is for an edge-emitting laser. Even if the size of the electrode layer 228 in the laser structure 200 of *Kneissl* were reduced, it would not be obvious to a person skilled in the art to apply a watertight material to all the free areas of contact layer 224, since *Kneissl* only teaches the need to cover exposed etched surfaces with an insulating dielectric 225. Consequently, the claimed invention is unobvious over *Kneissl*.

Dependent claims

In view of the patentability of amended independent claim 1, for the reasons presented above, each of dependent claims 4-8 is patentable therewith over the prior art.

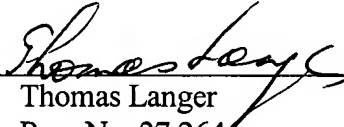
Conclusion

Based on all of the above, it is respectfully submitted that the present application is now in proper condition for allowance. Prompt and favorable action to this effect and early passing of this application to issue are respectfully solicited.

Should the Examiner have any comments, questions, suggestions or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.

Respectfully submitted,

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